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Optimization of the source field-plate design for low dynamic R_{DS-ON} dispersion of AlGaIn/GaN MIS-HEMTs

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Pulsed I-V measurements and TCAD simulations were used to study the effect of the source field-plate on the dynamic ON-resistance (R_{DS-ON}) of AlGaIn/GaN MIS-HEMTs. Several field-plate variations were studied: starting from a basic configuration with only a gate field-plate up to a configuration with one gate field-plate and two levels of source field-plate. Different field-plate lengths were also measured and simulated. The source field-plate modified the electric field profile by generating peaks of different intensity and spatial location. It is found that both intensity and position of these peaks are closely related to the dynamic R_{DS-ON} dispersion. A correct design of the source field-plates that considers these two aspects is thus necessary to improve the switching performance of the device.